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**Enabling Innovation in Large Companies Using Innovation Hubs, Corporate Accelerators or Incubators:
A Practical Example of Deutsche Lufthansa AG**

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Abstract

To overcome the obstacles to innovation, large companies have increasingly created corporate innovation hubs, accelerators or incubators. This study uses the example of the Deutsche Lufthansa Group to illustrate their main considerations, opportunities and challenges. It provides first the set-up, design and evaluation of Lufthansa's innovation hub model and then derives six key implications other companies should acknowledge when creating a respective hub. One of them is of particular importance: Since ideas that were initially developed and fostered by an innovation hub often lose ground thereafter, each innovation hub should establish a clear "follow up" plan as an inevitable strategic element.

Keywords

Innovation Hubs

Airlines

Disruptive change

Digitalization

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1. Introduction

Watching the daily news, there are few weeks without a groundbreaking achievement being announced. For example, just a couple of days ago, a Chinese start-up called Ehang announced that it took the first passenger drone up in the air. Considering how incredibly fast the world is changing, how often industries are disrupted and even how often new industries emerge, innovation has become a key for every company to survive (Leifer, O'Connor, and Rice 2001). Since the 1940s when Joseph Schumpeter (1934) stated that small firms are more likely to be the source of innovation, researchers as well as executives, have tried to find a way to empower also large, established and usually idle companies such as major airlines to create innovations. One way to do so, is the creation of innovation hubs, corporate incubators, accelerators or likewise business units. Those units are often separated departments, accelerating internal or external ideas, cooperating with the start-up world or looking for interesting business ideas / companies to invest in. (O'Reilly and Tushman 2004; Solis et al. 2015)

To gain further insights into this topic, this thesis assesses the main considerations, opportunities and challenges of those units, using the example of the Innovation Hub of Deutsche Lufthansa. Starting with a short background of innovation and its obstacles within large companies, the study then establishes the design elements and key success factors of X-Hubs, which have been found in literature. Thereafter it uses expert interviews to describe and evaluate the model of Deutsche Lufthansa and characterizes the key findings and their conclusions.

2. Theoretical Background

2.1. Disruption and innovation

To introduce the topic of innovation, this part depicts why innovation has become so important, what innovation exactly means and why especially large and established companies are struggling with it.

2.1.1. A short background: Disruption due to digitization

Disruption, a major cause for the change or even disappearance of entire industries, is feared today more than ever. Executives all around the world in almost every industry are afraid that their company will become the next Nokia or Kodak (O'Reilly and Tushman 2004). In fact, 52% of the Fortune 500 have been merged, acquired or gone bankrupt since the beginning of the new century (Herve and Bischoff 2016).

Looking at the airline industry, the first wave of disruption started when low cost carriers evolved, enabled – among others – by a loosening of governmental restrictions. Thereafter, it was especially digitization that changed the industry conditions so much, that disruption has been now all of a sudden possible. According to Carsten Spohr – CEO of Deutsche Lufthansa Group –, “digitization is the biggest threat since budget airlines” disrupted the market (Kiani-Kreß 2017). Surely, intermediaries such as AirBnB or Uber – all grounded on the merits of digitization – won't become an airline, but they might take over e.g. distribution, loyalty services, onboard entertainment, flight routing and much more and thus leave the airline with a much smaller part of the value chain. They have vast amount of customer data, established technological networks and the ability to innovate faster. As a result, we experience the rise of new business models threatening the classical way of doing business in the airline industry. Subsequently, to become not obsolete, airlines need to catch up with digitization and the innovations it brings with it. (Skift 2017)

2.1.2. Innovation terminology

According to O'Sullivan and Dooley (2008), “Innovation is the process of making changes, large and small, radical and incremental, to products, processes, and services that result in the introduction of something new for the organization that adds value to customers and contributes to the knowledge store of the organization”. Using this definition, various kinds of innovation

exist – be it radical or incremental innovation, product or process innovation, disruptive or sustaining innovation.

While incremental innovations mostly enhance efficiency or improve processes and products, radical / breakthrough innovations are more ambitious, offer a higher potential return and are more risky. They have a high degree of novelty – either for the organization, the customer or the whole world – and often change the way business is conducted or organizations work. Especially digitization has been one of the recent foundations for radical innovations. (Kasmire, Korhonen, and Nikolic 2012; Kuratko, Covin, and Hornsby 2014)

Acknowledging that both radical as well as incremental innovations constitute a critical measure to ensure long-term growth and renewal for large companies such as major airlines, why are so many still struggling with it? (Tushman 1997; Birkinshaw and Gibson 2004)

2.1.3. Impediments to innovation within large organizations

Considering recent literature, there are especially four main areas that impede success in creating radical innovations simultaneously to incremental ones: Organizational culture, structure, employees and processes.¹²

Firstly, it is usually the culture of established companies such as major airlines, lacking many of the essential values for breakthrough innovations: Entrepreneurship, risk taking, flexibility and creativity (Govindarajan and Kopalle 2005). Further exacerbating, most large organizations also lack the ability and willingness to change due to cultural inertia. Cultural inertia creates an idle organization, incapable to cope with the complex needs of developing radical innovations (Christensen and Raynor 2003). This does not only include the inability to learn, but also to unlearn – “the process by which people and organizations eliminate old logics” (Sinkula 2002).

¹ See Appendix 1 for an overview of the main obstacles of innovation within large organizations.

² Beside of these four internal factors, there are also several aspects of the external environment, that influence innovativeness. Examples are industry dynamics, competitive pressure, governmental restrictions etc. (Yu and Hang 2010).

Secondly, in order to improve efficiency and reduce failures, a hierarchical structure is often employed by large companies (Tushman 1997). As a consequence, a vast amount of bureaucratic rules and procedures are created, decisions need endless time to be approved and flexibility is almost impossible to achieve (Assink 2006).

Thirdly, as reflected in the organizational culture, large companies often hire and retain employees – including middle and senior management – who are more risk averse and less innovation seeking than needed. They often lack employees who are fascinated by entrepreneurial thinking and strive for new breakthrough solutions. Additionally, even if companies recognize the need to recruit more innovative driven people, they have hard times to attract them (Solis et al. 2015). Also, instead of promoting people that try out new things and are eager to create something new, most established companies have created incentive systems that benefit those seeking efficiency, quality improvements and short term profits. As a consequence, people having great ideas often leave the company and start their own businesses – a phenomena called “brain drain” (Christensen and Bower 1996). Furthermore, due to pressures from equity markets and the resulting short- to mid-term goals, middle- to senior manager constantly try to avoid risk and often discard new ideas, given the high uncertainty and long term prospect of more radical innovations. (Yu and Hang 2010; Baumann and Stieglitz 2014; Kuratko, Covin, and Hornsby 2014; Assink 2006; Leifer, O’Connor, and Rice 2001)

Beside, processes with regard to investment decisions, customer orientation and innovation management are other big obstacles. While the continuous improvement and fine-tuning of specific processes enhances efficiency, those “core competencies” often become “core rigidities” (Leonard-Barton 1992). According to Ahuja and Lampert (2001), most large firms keep on doing the same things and same processes and search for solutions in areas close to the companies’ core capabilities. This so-called “familiarity trap” along with the “propinquity trap” hinders the exploration of new and innovative things. Even further, structured routines cause

innovations to be typically evaluated the same way, independent whether it is a radical or incremental innovation (Yu and Hang 2010). This is a huge mistake since outcomes for radical innovation are hard to predict and highly uncertain. Besides, experimenting and failures are inevitable if innovations are desired. Moreover, another big problem that occurs when evaluating innovations is cannibalization (Horn and Tokarski 2016). While more radical innovations often create new markets, they also take existing customers.

To summarize, the culture, structure, employees and processes create an environment that is usually efficiency enhancing, risk avoiding and inflexible. As a result, large organizations tend to struggle especially with creating radical innovations.

2.2. Enabling innovation using X-Hubs

Whereas some scholars believe that large companies such as most major airlines are simply incapable of overcoming the discussed obstacles (e.g. Christensen 1997), several others have developed diverse ideas and models of how to prove the opposite (e.g. Ahuja and Lampert 2001; Leifer et al. 2000; Christensen and Raynor 2003). One way to do so is the creation of so-called corporate accelerators, innovation hubs or corporate incubators. Proving their enormous relevance, according to the International Business Innovation Association approximately 7000 of such units exist worldwide (cited in Herve and Bischofink 2016).

Herve and Bischofink (2016) describe them as corporate centers that focus solely on innovation and “provide an autonomous environment for innovative people to team up”. They intend to combine the advantages of both, large corporates with their vast resources and networks as well as start-ups with their agility, creativity and willingness to take risks. However, variations to design such a hub are diverse and no single blue print has emerged yet. Some of them look externally for ideas to invest in, build on or partner with, while others try to facilitate idea generation within the organization. Acknowledging this and the broad variety of names –

among others accelerator, innovation hub, innovation lab, incubator etc. – this thesis will refer to them as “X-Hubs”. (Weiblen and Chesbrough 2015)

Within this part, firstly several alternatives to design an X-Hub are labelled. Thereafter, the five key criteria for success and possible consequential benefits are described.

2.2.1. Optional design and set-up factors

While a few researchers have tried to provide guidelines to design and create X-Hubs, most of them focused only on specific alternatives. Thus, in order to give an overview, a short framework was created, compromising the most important design factors assessed by e.g. Herve and Bischopnik (2016), Solis et al. (2015), Weiblen and Chesbrough (2015) and Kohler (2016). Correspondingly, an organization has to decide on especially seven optional factors within two main decision areas: the X-Hub program design and the X-Hub set up.³

Program design

Firstly, an X-Hub has to decide to **search for ideas outside and / or inside the organization**. Depending on the purpose, some X-Hubs cooperate with external start-ups or individuals, while other X-Hubs relied solely on the ideas of employees within their mother company (Herve and Bischopink 2016). An example for an X-Hub pursuing internal ideation is “Area 120” of Google. “Area 120” allows employees of Google to apply to the program with their idea and receive, if accepted, a funding, support and several months off (Helft 2016). Contrary, the “AT&T aspire accelerator” gives external start-ups the chance to receive funding, support and training if their idea is promising (AT&T 2018).

Secondly, each X-Hub has to decide on its **main tasks and value proposition**. Whilst literature as well as practical evidence show a countless number of alternatives, there are especially four main tasks to pursue: *Support, Partner, Build or Invest*. An X-Hub usually supports an idea / start-up by providing e.g. mentoring, workshops, facilities or organizational networks. It might

³ See Appendix 2 for an overview.

also try to create or facilitate partnerships with the mother organizations and the start-up. An airline could for example partner with a blockchain based marketplace to access new direct distribution channels. Next to creating partnerships, X-Hubs rarely invest in potential ideas / start-ups either themselves or by involving the mother company (Solis et al. 2015). An example for such a hub is “Samsung Next ventures”, investing primarily in start-ups that have a strategic fit with Samsung (Samsung Next 2018). Furthermore, X-Hubs might also design, develop, test and build new ideas and / or business models on their own. For instance, “Walmart Lab” is working on several innovations including In-Store robotics or crowdsourced delivery. (Solis et al. 2015; Weiblen and Chesbrough 2015; Kohler 2016; Herve and Bischopink 2016)

Thirdly, an X-Hub needs to determine its **topic focus**. It might either focus on topics adjacent to its mother company in order to have a strategic fit, or target topics that are completely unrelated to the company and / or industry in the hope of catching the next breakthrough. While both alternatives usually occur, the latter one is implemented much less. (Solis et al. 2015)

Fourthly, an X-Hub has to decide on the **stage of the ideas / start-ups** it wants to look for. Some X-Hubs might only look for “raw ideas” that have no developed business model or prototype, whereas others only aim for ideas that have a proven business model and some validated customers.⁴ (Herve and Bischopink 2016)

Lastly, an X-Hub needs to agree on the **period it wants to interact with the individual, team or start-up**. According to Kohler (2016), a typical program life cycle lasts three to six months. On the one hand, having a shorter life cycle is closer to the timeline of start-ups, enables a diversification on more ideas, enhances the focus of the idea generator and speeds up the innovation process. On the other hand, a longer lifecycle enables building closer relationships, networks and a much more successful implementation process. To take advantage of both

⁴ See Appendix 3 for the difference between incubators and accelerators based on the different support stages.

alternatives, some X-Hubs have a short life cycle program (three-six months), but try to stay in contact with the start-up / idea generator thereafter. (Kohler 2016; Herve and Bischopink 2016)

Beside of the five core factors, many other optional design elements exist, including among others: whether to take equity from start-ups as compensation, whether to focus on a geographical region and whether to pursue active or passive ideation.

Set-Up

Setting up an X-Hub brings two optional factors: the launch method and the governance model.

To **launch an X-Hub**, a company might either build one on its own, create a joint venture with another corporate or buy into an existing platform. On the one side, buying into an existing platform often serves as a way to enter the X-Hub environment in a fast way and to reduce risk and benefit from an already thriving network and established best practices (Kohler 2016). Plug&Play for instance offers corporate organizations the opportunity to take advantage of their established ecosystem. It has already helped several corporates such as Deutsche Bank, Mercedes-Benz or Bayer to connect with the start-up environment (Plug & Play Tech Center 2018). On the other side, building the X-Hub itself or creating a joint venture enables a larger scalability, higher individualization and greater organizational learning.

Furthermore, the **governance model** of an X-Hub is another very important element. It can be either set up de-centralized, centralized or autonomous.⁵ While within a de-centralized model X-Hubs are connected to distinct business units, a centralized set-up creates a “central X-Hub” connecting several other independent X-Hubs. This central X-Hub coordinates, shares knowledge and connects the individual X-Hubs with business units. Lastly, within the autonomous model, the X-Hub reports only to a CxO enabling a more independent approach. (Solis et al. 2015)

⁵ Appendix 4 provides a good overview of all three alternatives.

Likewise as with the program design, the two discussed factors are by far not all and compromise only the two most important ones. Further decision points are inter alia: whether to establish partnerships with research institutes or which location to use.

2.2.2. Non-optional key success factors

As discussed above, X-Hubs try to eliminate the obstacles of large organizations in order to implement both radical and incremental innovation using several design alternatives. Yet, according to O'Connor (2006), only few of them lasted very long or created a sustainable impact for the organization. Consequently, while all of the above mentioned design and set-up variations might be feasible for success, there are especially five key success factors that shouldn't be optional.⁶

1) Independence of the X-Hub

X-Hubs can only break the obstacles to innovation if they can set up their own culture, structure, processes and employee mix and have the freedom and independence to make all major decisions (O'Reilly and Tushman 2004). This doesn't necessarily have to result in an autonomous governance model. Also a centralized model might be sufficient if each Hub has enough freedom. Yet, the creation of a separate legal entity is often one of the easiest ways to ensure independence (Weiblen and Chesbrough 2015).

2) Involvement of the mother company

While independence is highly important, X-Hubs simultaneously need to make sure that they don't get totally disconnected from the mother organization. They still have to rely heavily on the resources, brand name and network of the larger organization to have a competitive advantage over independent accelerators, venture capital firms, incubators etc. (O'Connor 2006). Consequently, a balance between independence and integration is key. (Solis et al. 2015)

⁶ Solis et al. (2015) further developed a three phases success factor model. See in Appendix 5.

3) Senior Management Support

Facilitating both, independence as well as integration, senior management support is essential for the success of the X-Hub. Only with the commitment of the CEO and most high-level managers, an X-Hub has the organization wide support and backing. (Solis et al. 2015)

4) Clear Vision & Focus

Besides, in order to deliver value to the organisation, a clear purpose and vision of the X-Hub is crucial. Its topic focus, main tasks and strategic linkage with the organisation need to be clearly defined. Furthermore, it is highly important that both the X-Hub as well as the organization share a common vision that is pursued. (Kreimeier 2017; Tucker 2017)

5) Right employees

Lastly, an X-Hub can only succeed if it has, unlike the mother organization, employees with an entrepreneurial mindset, a creative thinking and a certain risk-loving attitude. The composition of the staff needs to be diverse and should bring a certain experience of the start-up environment (Solis et al. 2015). Especially the leader of the X-Hub should have a well-connected network and brand name within the start-up world (Tucker 2017).

2.2.3. Key benefits

Consequently, the independence of the X-Hub and the right employees should help to overcome the obstacles large organizations, such as major airlines, usually face when pursuing innovation. Additionally, the involvement of the mother company, management support and a clear vision aid to simultaneously make use of the advantages a large organization bears, such as resources, brand name, distribution channels or networks. All in all, the most prevalent benefits of successful X-Hubs are:

- 1) Accelerate the **speed of innovation** (Solis et al. 2015)
- 2) Become **part of the innovation communities**, empowering early **recognition of trends** and a valuable source for fresh ideas (Weiblen and Chesbrough 2015)

- 3) Enhance **risk taking abilities** (Solis et al. 2015)
- 4) Introduce **innovative process management** practices such as design thinking
- 5) Build a **culture of innovation in the larger organization** by transferring values and knowledge from the X-Hub to the mother organization (Kohler 2016)
- 6) Enhance attractiveness to **entrepreneurial talents** and thus the probability to attract and recruit them (Leifer, O'Connor, and Rice 2001)
- 7) Drive **employee engagement**, since most people are usually highly excited when working on new technologies or breakthrough innovations (Solis et al. 2015)
- 8) Have a direct impact on profits by developing and facilitating **new products, business models, partnerships or investments** (Kohler 2016)

3. Research Questions and Methodology

3.1. Research questions

After having established the theoretical framework, the thesis will now evaluate how an X-Hub framework is implemented in reality, using the Deutsche Lufthansa Group (LH Group) as an example. The empirical questions the paper at hand is dealing with are therefore the following:

1. *Why and how has the LH Group designed its X-Hub to enable innovation?*
2. *What are the opportunities and challenges the LH Group faced when it created the X-Hub and what does this imply for other companies building an X-Hub?*

3.2. Methodology

In order to answer these questions, a research methodology was adapted leveraging especially primary research: nine expert interviews and the author's own internship experience.

Using purposive sampling, the interviewees were selected deliberately with pre-interviews that helped to determine whether a person had enough experience and knowledge about the topic (Silverman 2013). As a result, nine semi-structured interviews with senior experts were conducted – all of them in German and via telephone (average duration: 40 minutes). Six of

them were LH Group employees – all of them from different departments and subsidiaries – while the three others were external innovation experts from other industries. During the interviews predetermined topics and questions were used. This enabled the interviewer to switch the focus and ask questions in between, while still guiding the interview towards the appropriate direction. Due to privacy reasons, shortcuts for every interviewee will be used.⁷

Additionally, the author's internship experience within the strategic ancillary service department of the LH Group is used to permit an even deeper understanding of the research questions. This department is responsible for developing ancillary business models / products and is therefore appropriately involved in the innovation process of the LH Group.

4. Practical Application – Deutsche Lufthansa Group

This part gives a short overview of the LH Group, its problems in terms of innovation and its overall innovation strategy. Thereafter, the thesis delves into one of the LH Group's key innovation initiatives, the X-Hub. It is described how the X-Hub is designed, using the framework that was established within the literature review. Lastly, the key challenges and opportunities along the five key success factors are depicted.

4.1. Deutsche Lufthansa Group – An overview

The LH Group is one of the largest aviation companies worldwide. Founded in 1953, it has 130.000 employees generating around 35 billion € in revenue. It is market leader in several markets – predominantly in the classical aviation industry but also in other aviation markets such as cargo aviation, technical support, IT systems or catering. (Lufthansa Group 2017)

4.1.1. Obstacles to innovation

The LH Group is facing the threat of disruption stemming from digitization just as hard as most other major airlines. As one of the interviewees said: *“If Lufthansa is not catching up in terms*

⁷ A short description of all the interviewees, the interview guidelines and a transcription for each topic can be found in Appendix 10 to 18.

of digitization and all the innovation that comes with it, we might end up having no customer touchpoints anymore and provide solely the service of flying, while digital players such as Google will take over the major parts of the value chain” (LH 5). When asking about obstacles to innovation within the LH Group, most statements were within the four areas discussed before: culture, structure, employees and processes.

First, according to LH 4, *“culture is the biggest obstacle for innovation within LH. There is always the tendency to avoid risk and experimenting as well as to favour everything that improves efficiency.”* Furthermore, he said that *“people are also not able to change this mindset”*, referring to the consequences of cultural inertia – the inability to learn and unlearn.

Secondly, the large size of the LH group has created a complex and hierarchical structure. As LH 5 stated: *“Due to governance, hierarchies, approval processes and controlling, most ideas get lost. [...] All of this is the opposite of acting innovatively and agile.”*

Thirdly, while all interviewees complained about a wrongly defined incentive system, not all had the impression that people with innovative skills were missing. LH 5 for example said: *“I think we have great employees and many of them are capable to think creatively, analytically and strategically. Thus, it is not a problem of having not enough ideas or people that think out of the box”*. Contrary LH 4 and LH 1 believed that employees are missing, *“who have an innovative mindset and who are willing to try out new things that have some uncertainty”*. They also claimed that *“it is certainly hard for Lufthansa to attract the digital and innovative minds”*.

Lastly, processes were often mentioned to inhibit innovation due to the “familiarity trap”, a large and complex IT system and wrong evaluation methods.

To put it in a nutshell, the LH Group certainly faces many obstacles that hinder innovation. Interestingly, most experts also highlighted that especially radical innovations are an issue. For example according to LH 3, *“Lufthansa has especially a problem with the creation of innovations that are completely new and have less to do with the things we usually do”*.

4.1.2. The three step strategy for digitization

To solve these issues, the LH Group has announced its new strategy, which is – as LH 3 pronounced when talking about the general innovation strategy – focused “*not on innovation itself but on digitization*“. This will involve – among others – an investment of over 500 Mio € into this area during the next years, a radical renewal of the work force, the creation of a new CxO function – the Chief Digital Officer (CDO) –, as well as a three steps plan “*1) Digitize the core 2) Enhance own products 3) Create new business models*“ (LH 2). However, as stated by the CDO Dr. Christian Langer, the LH Group won’t change the whole organizational structure, culture, employees and processes, as the LH Group’s main asset has always been the trust of the customers. Consequently, retaining this trust implies that the LH Group has to avoid risk within its core functions – as e.g. the airplane operations – which was exactly the task of the old organizational system. The “job is thus to get two cultures into the company”: One that is risk averse, and one that goes fast, fails fast, learns a lot and experiences a lot. (Skift 2017)

4.2. The Lufthansa X-Hub model design

One measure to implement this strategy and fight the obstacles to innovations was the creation of an X-Hub model. This model encompasses – among others – the LH Innovation Hub, the LH Innovation Fund Board and several subsidiary-dependent ideation labs. Given the limit of this research, the thesis focused on the LH Innovation Hub and the Innovation Fund Board and gives only a short outline of the ideation labs.⁸

4.2.1. The Lufthansa Innovation Hub

Established in 2014, the Innovation Hub was awarded as “Germany’s best Innovation Lab in 2017” (Kreimeier 2017). It focuses predominantly on external sources and “*creates the interface between the LH Group and the global travel tech scene*”. (LH 1)

⁸ See Appendix 6 for an overview of the model.

Contrary to many other X-Hubs, the main tasks / value propositions are – Build, Partner and Invest – instead of providing classical support. As stated by LH 1, „*we are not an accelerator or incubator, providing co-working space or mentoring. Instead we are looking for partnerships or ideas to develop and sometimes to invest in*“. When building a product or new innovative business model, „*with a team of three people and sometimes some external experts, we develop first a minimum viable product, validate the product with a customer and provide an initial proof of concept*“ (LH 1). At the end, the new idea is either incorporated into a business unit of the LH Group, a new company is founded with external funds or additional internal funds of the LH Group, provided by the Innovation Fund Board, are utilized. Correspondingly, the Innovation Hub is also an inhouse laboratory using external trends to create new business models (CAPA - Center for Aviation 2017). One exemplary innovation that was built by the Innovation Hub is “Bite”, a temporary, customizable, context specific digital travel insurance. Instead of having a complex insurance package, “Bite” customer pay only for what they really need. (Bite Insurance 2018) Secondly, creating a partnership usually involves introducing „*the LH Group to innovative travel tech start-ups and helps them to develop a common partnership product*“ (LH 1). “Skyroam” is one recent example of a partnership initiated by the hub. The service that is now sold by Lufthansa allows customer to have direct internet access in 100 countries around the world (Lufthansa Innovation Hub 2018). Lastly, the Innovation Hub encourages „*Lufthansa to invest into specific start-ups and ideas that we have spotted and evaluated*“ (LH 1). However, it has no own innovation fund yet, even though the development is in process for two years already. As stated by LH 1, „*the only investment we accompanied so far was done with Lufthansa Cargo*“. The investment “Fleet Logistics”, acts as an online marketplace, matching customers' demand for freight services with free capacity provided by logistics companies.

Given the strong strategic focus of the LH Group on digitization, the Innovation Hub is primary screening the travel tech ecosystem for digital solutions / business models – as can be seen by the three examples above.⁹ The ideas should either improve the business of the LH Group (better business topics) or create a new innovative business model or product (new business topics). In both cases an advantage due to the leverage with the LH Group should be given.

Depending on whether an idea is built or a partnership or investment is pursued, a different stage of the idea / start-up is desired. Regarding partnerships and investments *“we look out for start-ups with an initial proof of concept. Start-ups at the idea stage do not qualify. A good early indicator is whether they already have a disclosed Venture capital backing”* (LH 1).

Similarly, *„there is no fixed duration. It always depends on the project and task“* (LH 4). While a partnership sometimes only involves the process of connecting the start-up and the relevant business unit, building a project endures usually three months, during which the Innovation Hub builds a prototype and validates the initial hypothesis by doing a test launch at the market. Regarding the set-up, the Innovation Hub was founded by the LH Group itself. With a team of eight people, for three months, *“[...] we tested whether an innovation hub cooperating with the LH Group might be successful”* (LH 1). After the successful test, an independent company was founded as a 100% LH Group subsidiary. However, in order to become faster established within the start-up ecosystem, the Innovation Hub partnered with one of the largest innovation accelerator platforms Plug&Play. *“[...] Organized as a separate entity”* (LH 6) the Innovation Hub only has to report to the CDO and is consequently depicting an autonomous model.

4.2.2. The Lufthansa Innovation Fund Board

Contrary to the Innovation Hub, the Innovation Fund Board enables employees to submit their ideas and receive initial funding. At the Innovation Fund Board *“all employees of all subsidiaries have the right to apply”* (LH 2).

⁹ See appendix 7 for an overview of the key topics in 2017.

The key task of the Fund Board is to fund potential employee's solutions. *"Innovative ideas can apply to get a funding of up to 500.000 € for one year. The approval and funding is much faster than in the typical Lufthansa organization"* (LH 2) and avoids the typical bureaucratic hurdles and long waiting time. The Fund Board also *"serves as an alternative to invest into ideas of the Innovation Hub that have been tested and developed and are therefore no longer funded by it"* (LH 1). However, there is no non-financial support provided by the Fund Board.

Contrary to the Innovation Hub, *„the Innovation Fund Board is not restricted to digital ideas“* (LH 2) but focused on all kind of innovations. It is *"[...] supporting ideas that are new to the organization and don't belong to the classical product life cycle. Classical product improvements, however, need to be financed via the business unit"* (LH 2).

To apply for funding, the Fund Board requires *"[...] no clearly defined staged in which the idea has to be. You don't necessarily need a business case. The only thing you need to provide is a short idea outline and a justification of how much money you need and for what"* (LH 3). However, according to LH 6, *"a late stage funding is rather rare and occurs only sometimes"*. In terms of the set-up, the Fund Board was founded by the LH Group without any partnership or joint venture collaboration. *"It is part of the business unit managed by the CDO"* (LH 6) and has to report directly to him.

4.2.3. Subsidiary dependent ideation labs

Next to the Innovation Hub and Fund Board – both annexed to the entire LH Group – several subsidiaries have created various versions of ideation labs, incubators or similar models. Most of them provide support by developing, challenging or even finding an idea for a discovered problem during workshops. One example is the accelerator of the LH aviation brand, where employees can apply with their idea to further develop and challenge it during a five day workshop and a three month support period. The outcome is a tested hypothesis, a developed

business model and a pitch presentation. Another model applied by Lufthansa Systems is “InventIT”. *“InventIT provides support as well as a small initial funding of 50.000 €”* (LH 2). Commonly most of those subsidiary dependent ideation labs prepare the idea generator/s for the pitch at the Fund Board to receive further funding if the business unit or subsidiary is not investing in the idea yet or if the funding approval takes too long. As stated by LH 5, *“if you are applying for the Innovation Fund Board without the help of an incubator, the chance is really low to be accepted”*. However, they are also a good measure to further develop an idea fostered by a business unit with the help of professional innovation experts.

4.3. Evaluation and findings

Given the design and set-up, two questions remain: 1) How successfully did the Innovation Hub and Fund Board enable innovation? 2) What were the major challenges and opportunities to do so? To answer these questions, the findings are grouped along the five key success factors.¹⁰

Independence

In line with the literature, the example of the Innovation Hub illustrates that creating a separate entity is one important measure to ensure sufficient freedom from the mother company. In addition, it reveals that a budget, independent of the business units and approved for a longer time, further enhances the freedom to decide on all major issues. Contrary, the Fund Board is not organized as a separate entity and needs to apply for a budget every year. It only *“has the freedom to decide which ideas to invest in”*(LH 2).

Furthermore, the interviews demonstrate that while an X-Hub – in this case the Innovation Hub – has all the freedom to develop products or create partnerships, it has often not the autonomy to do its own investment. Besides, the Innovation Hub displays that an X-Hub might also not have the resources and authority to implement and scale a product or business model after the

¹⁰ Appendix 8 depicts all pro’s and con’s as well as an overall rating of the performance in each category.

planned “support duration”. Thus, it needs to apply for additional funding or coordinate with a business unit to implement it, which is, as we will see, a fundamental issue.

Another key challenge, that cannot be found within literature but most experts reported, is that X-Hubs – here the Fund Board – a lot of times still depend upon the head of the business unit, due to the need to release employees from daily work. As a consequence, *“the idea has already gone through different approval rounds within your business unit”* (LH 4) until the allocation of man power is authorized.

Lastly, on the one side, experts asserted that the Innovation Hub as an independent unit *“doesn’t need to request for approvals. Instead we can bypass the typical LH rules, have the freedom to test and fail... and act as a speedboat for the LH Group”*. It was thereby also empowered to create an entrepreneurial culture and mindset opposite to the traditional and risk avoiding LH Group. On the other side, the Fund Board was seen as having a strong political aspect, bureaucracy and inflexibility – mainly due to the lack of independence.

Involvement of the mother company

Accordingly, the example illustrates that the stronger the independence of the X-Hub, the more difficult it is to maintain an involvement of the mother company and vice versa.

Undoubtedly, the Innovation Hub depicts how to leverage the advantages of a strong mother company – the LH Group: The brand to open doors, the marketing & distribution channels to scale up and the employee’s skill set to exploit expertise. Furthermore, it demonstrates how to involve the business units from the very first beginning: *“When looking for partnerships, we initially used a push concept, suggesting interesting ideas to the business units. However we switched to a pull concept later on, integrating and asking the business units from the very first beginning”* (LH 1). Yet, the case demonstrates a critical issue which research has not investigated so far: Since the *“the Innovation Hub is too much encapsulated as if it is working on another planet [...] many ideas are neglected and lose ground after it has developed and*

forwarded them to a specific business unit” (LH 1 and 4). Moreover, another revealed challenge is that *“it is not transferring any cultural aspect or process knowledge to the LH Group“* (LH 4) even though several workshops and presentations about the Innovation Hub and its methods were conducted within the LH Group.

The Fund Board on the other hand possesses a higher success rate of implementing ideas within business units after the funding, as the middle management has to accept the idea more or less already in the beginning to release the employee from his / her daily tasks. Also the cultural and knowledge transfer is seen to be more successful by some experts: *“In general I would say, that most people became more open to all concepts and ideas around innovation”* (LH 6). Yet, few critical experts also avowed issues with the implementation and cultural transfer in the case of the Fund Board.

Lastly, on an overall level, the example unveils the problem that X-Hubs often lack a centralized knowledge sharing function that coordinates and monitors all innovation projects and ideas.

Senior Management Support

In terms of the senior management support, the experts approved its importance and provide evidence that both initiatives show a strongly positive performance. *“Innovation & digitization is a fixed strategic priority of CEO Carsten Spohr”* (LH 3), the Innovation Hub is managed by a CxO function and middle management shows a rising interest in many initiatives and places a majority of the Fund Board’s members.

Clear Vision & Focus

Similarly, experts agreed on the importance of having a clear vision & focus and likewise offered evidence that both the Innovation Hub as well as the Fund Board comply with this notion. While the Innovation Hub is focused on digitization and the connection to the global travel tech scene, the Fund Board has the task to fund all potential innovative ideas that are new

to the company. Additionally, the case exemplifies the significance of a strong coordination with the group wide vision – in this case to “modernize and digitalize the LH Group”.

However, it also demonstrates that setting a “clear” goal is hard to achieve and often subjective.

As LH 5 specified, *“When I applied, the Fund Board was not sure whether the idea is ‘new’ enough to qualify for the funding”*. Besides, the example unveils the challenge that even though an X-Hub has set a clear goal to pursue new businesses, incremental innovations are still too much favoured. Without specifically asking, LH 6 for example pronounced: *“While incremental innovations work out pretty well, I feel that new business topics are to rarely fostered and developed, even within the Innovation Hub”*.

Right Employees

Lastly, especially the Innovation Hub serves as a role model when it comes to attracting and retaining a mix of employees perfectly suited to the area of innovation. *„Due to our innovative approach and freedom, we were able to attract digital and entrepreneurial minds [...]”*(LH 1).

Led by Gleb Tritus, a successful entrepreneur and regarded personality within the start-up environment as well as Christian Langer, the Chief Digital Officer, the Innovation Hub further demonstrates a great inspiration for other X-Hubs which kind of leaders to choose.

Contrary, the Fund Board consists only of senior managers of diverse LH Group business units. While this ensures a great diversity, some experts were worried, that the members *“have not the innovative mind that is open for failure and risk”* (LH 4). To avoid this, one expert disclosed the idea to involve external experts within X-Hubs to achieve a greater diversity and fresh ideas.

5. Conclusions and General Learnings

To summarize, the example of the LH Group provides both an extensive support for conclusions of recent research as well as new findings that lead to newly revealed considerations, opportunities and challenges of X-Hubs.

It surely validates the importance of all five key success factors, the way recent literature suggests to achieve them and the benefits they bring if implemented correctly. However, the example also demonstrates the high complexity complying with all of them. Starting with the Innovation Hub, it serves as a role model for other companies that want to establish an X-Hub when it comes to creating a separate entity, recruiting the right employees and gaining senior management support. It also exemplifies how to simultaneously make use of the mother company's resources, as strongly suggested by O'Connor (2006). Due to all those points, the Innovation Hub was able to create a new culture with innovative values and processes. This, in turn, allowed accelerating the speed of innovation, attracting and recruiting entrepreneurial minds and becoming part of the start-up environment to gather insights on trends. As stated by LH 1, *"tech conferences in over 16 cities in nine countries and three continents were attended in 2017"*. Besides, only in 2018, 217 ideas for new business models were assessed from which eight were developed into prototypes and projects. One successful example is airlinecheckins.com. Independent of the airline, this platform manages the check-in and secures the favorite seat for its customer (Lufthansa Innovation Hub 2018). Additionally, the case depicts how the Fund Board used its little independence to decide on which ideas to fund along with the involvement of the relevant business units to foster the development of employee's ideas. This in turn drove employee engagement and the transfer of innovative values and processes into the organization.¹¹

Looking at the new findings and their implications, there are especially six revealed conclusions other companies building an X-Hub should acknowledge and learn from:

1. Use an independent budget that is approved for a longer time

First, the case exposes that an independent budget that is approved for a longer time helps an X-Hub to achieve independence and all the benefits coming with it. While the Fund Board

¹¹ Appendix 9 depicts an overview of the key benefits created by the Lufthansa X-Hub

depicts that a budget that is given every year enhances the exposure to bureaucracy, short term thinking and risk aversion, the Innovation Hub shows that a long term budget, which is independent of the business unit fosters flexibility and risk appetite.

2. Knowledge sharing and innovation project monitoring is key

The second implication this case unveils is that dispersed innovation is well and good, but to leverage the size and amount of creativity, knowledge sharing and idea monitoring is essential. Even though the LH Group has already assessed this matter and built partly central innovation functions on a subsidiary level, no LH Group wide function exists that gives an overview over all projects, their status and problems. Therefore, it might indeed make sense to establish a central governance model, if independence of each hub is guaranteed. Beside of a central function, an open innovation system as suggested by O'Connor (2006) might also help to empower knowledge sharing within the organization.

3. Independence needs to involve the freedom to release employees from daily tasks

Thirdly, the case discloses that independence is often impeded due to the lack of authority over employees' working time. Even though the Fund Board has the authority to give the funding, without the business unit allowing the employee to work on the idea, this is worthless. As a consequence, independence to make all major decisions as stated by O'Reilly and Tushman (2004), should *"also include to release employees from their daily work"* (Expert 3). One solution would be to permit the Fund Board to release the employee at least part time. An example is the power and gas company E.ON: *"Here the accelerator has the right to release employees from 20% of their daily work to pursue the innovative idea"* (Expert 3).

4. Cultural transfer is inevitable to have a sustainable impact

Fourthly, the Innovation Hub illustrates that lack of involvement does not only hinder using the advantages of the mother company – as described by recent research – but especially the transfer of innovative values and knowledge. Due to too little involvement of the LH Group and its

business units, the Innovation Hub was not able to transfer its innovative culture and knowledge to the LH Group. However, this should always be part of the goal even though a completely cultural change might not be desired. One measure to further enhance involvement while still retaining the independence is to *“rotate business unit and functional leaders into innovation centers”* (Tucker 2017). This causes on the one hand the leader to bring in valuable knowledge and on the other hand to transfer innovative processes and values back to the business unit. Another mean is to locate an X-Hub subsidiary closer to the mother organization.

5. Establish a “follow up plan” as the sixth key success factor

Fifthly, one of the most important learnings of the Lufthansa X-Hub is that implementation and transfer of ideas and projects – initially developed by an X-Hub – often fail. In the case of the Innovation Hub and Fund Board many ideas were developed but then dismissed or lost ground. This is simply happening since the head of the business unit is overwhelmed with the daily tasks and is not incentivized in fostering a topic that is too far from the core business. Thus, *“you need to have a clear plan on how to transfer and implement projects after the support phase”* (Expert 3). One initiative would be a stronger involvement as described above in point four. Furthermore, a “transition team” could be used to support the project after the transfer from the X-Hub (Weiblen and Chesbrough 2015). Otherwise, the X-Hub could guarantee a longer and higher funding to support ideas that are further away from the core business. The LH Group is actually already planning a *“fund that has a much higher funding volume”* (LH 2). All in all, even though there are many ways to guarantee a better transfer and implementation, it is important to remember setting up a “follow up plan” at all. Acknowledging this, this thesis suggests using the “follow up plan” as a sixth key success factor.

6. The overall vision should stronger pursue and foster radical innovations.

Lastly, the LH Group X-Hub exemplifies that even though much was done, pursuing radical innovation in large companies is still a huge challenge. To avoid this pull effect towards

incremental innovation coming from the daily operations (Solis et al. 2015), a company has to stronger establish and implement the vision for radical innovation and might initiate further measures. One example would be to create a unit *“purely dedicated to radical innovation and detached from any short term goals”* (Expert 2). Further, it could create a *“cooperation with research institutes or universities”* (Expert 2 & 3).

6. Summary and Further Research Suggestions

To put it in a nutshell, this thesis shows that so-called X-Hubs constitute an efficient method to cope with the need and obstacles of large companies to implement radical as well as incremental innovation. While the Lufthansa Innovation Hub seeks externally for ideas to build, partner with or invest in, the Lufthansa Innovation Fund Board fosters internal ideas with an initial funding. Both provide an excellent example of how companies could set-up and design an X-Hub and what they especially should take care about. Furthermore, six key implications are determined, among them the need to establish a “follow up plan” as the sixth key success factor. However, as the variety of companies and their respective X-Hubs is large, this thesis is limited given the analysis of only one company. It is also limited since it uses only qualitative research. To cope with these limitations, further research could investigate a larger sample of X-Hubs and analyse which factors correlate the most with successful outcomes. This would also help to provide quantitative evidence on whether the assessed implications, such as giving X-Hubs the freedom to release employees, significantly enhance the probability of an X-Hub to succeed. Additionally, it would be helpful to assess the key considerations and elements of a successful “follow up plan”.

To finish, the outcome of the qualitative research significantly supports the recommendation that an established organization should develop an X-Hub to foster innovation. If created and implemented successfully using the six key success factors, it might create the next breakthrough innovation being announced in the daily news.

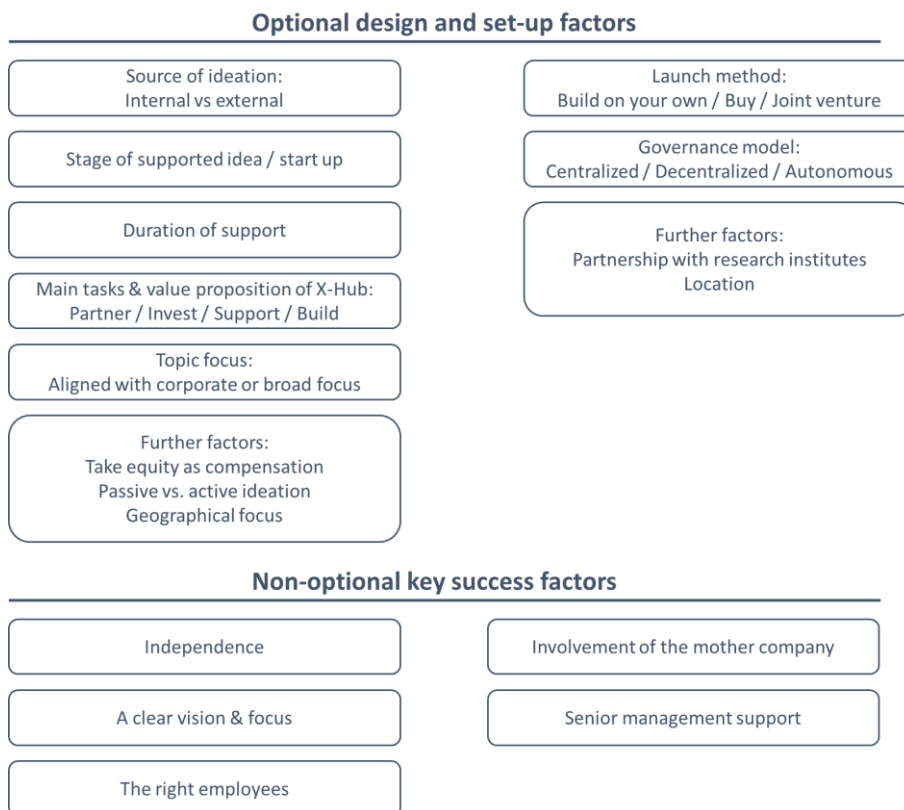
7. Appendix

Appendix 1: Obstacles of large companies to innovation – an overview

Organizational Culture	<ol style="list-style-type: none"> 1. Lack of important values needed for innovation: Entrepreneurship, Risk taking, flexibility, creativity 2. Cultural inertia <ol style="list-style-type: none"> a. Inability to learn new values or processes b. Inability to unlearn established values or processes
Organizational Structure	<ol style="list-style-type: none"> 1. Bureaucratic rules 2. Long approval time 3. Creation of strong political aspect
Employees	<ol style="list-style-type: none"> 1. Recruiting <ul style="list-style-type: none"> Lack of entrepreneurial and risk taking employees due to <ol style="list-style-type: none"> a) Not recognizing need b) Not attracting enough employees with such a skillset 2. Incentivizing & Retaining <ul style="list-style-type: none"> Systems foster efficiency, quality improvements and short term goals instead of experimenting, risk taking and long term goals for both: <ol style="list-style-type: none"> a) Normal employees (often leads to “brain drain”) b) Middle and Senior Management (often leads to rejection of potential innovation ideas)
Processes	<ol style="list-style-type: none"> 1. Investment & Evaluation processes <ol style="list-style-type: none"> a) Structured routines – evaluation of innovations equally as normal investments b) Fear of cannibalization 2. Customer orientation <ol style="list-style-type: none"> a) Too strong focus on existing customer instead of looking for non-existing need / customers and markets 3. Innovation management <ol style="list-style-type: none"> a) Familiarity trap - (Ahuja and Lampert, 2001) – many firms stick to what they know and try to develop ever further on this b) Propinquity trap - (Ahuja and Lampert, 2001) – Search for solutions in the neighborhood of existing solution

Source: Author based on literature Review

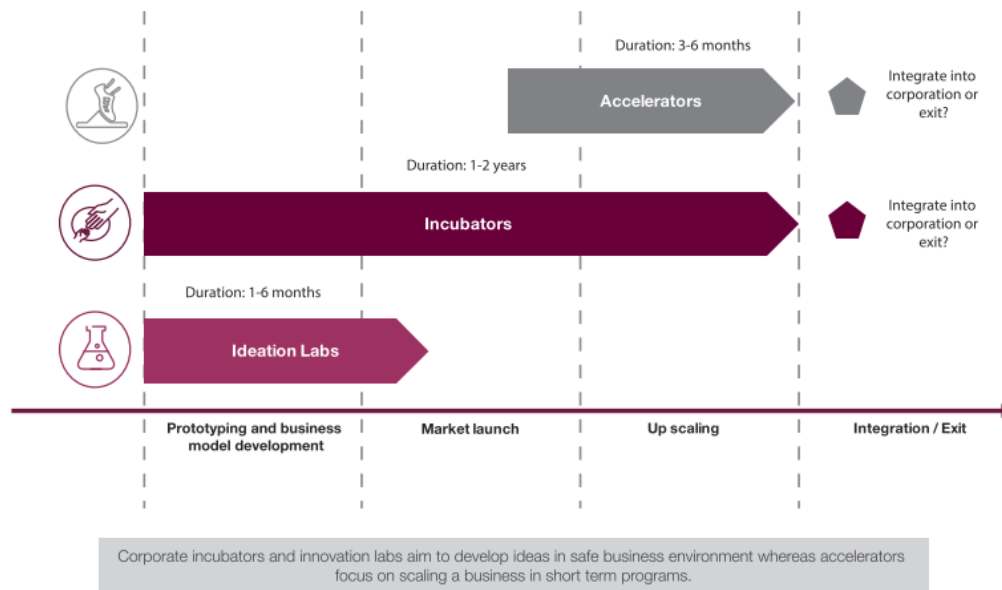
Appendix 2: Alternatives to design and set-up an X-Hub



Source: Author – based on literature review

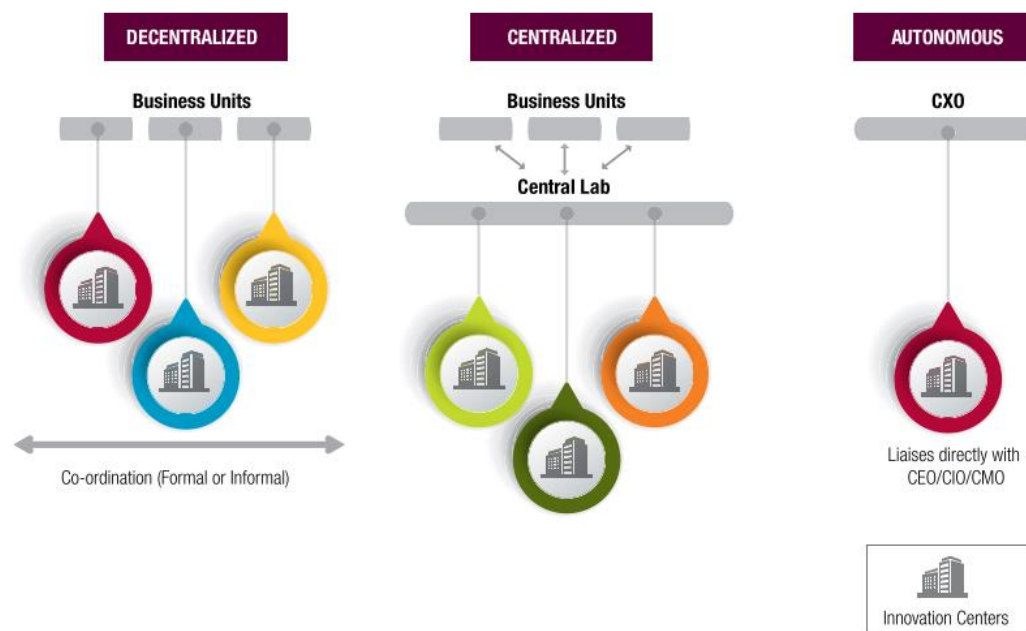
Appendix 3: Different support stages

Figure 3: Timing of Support



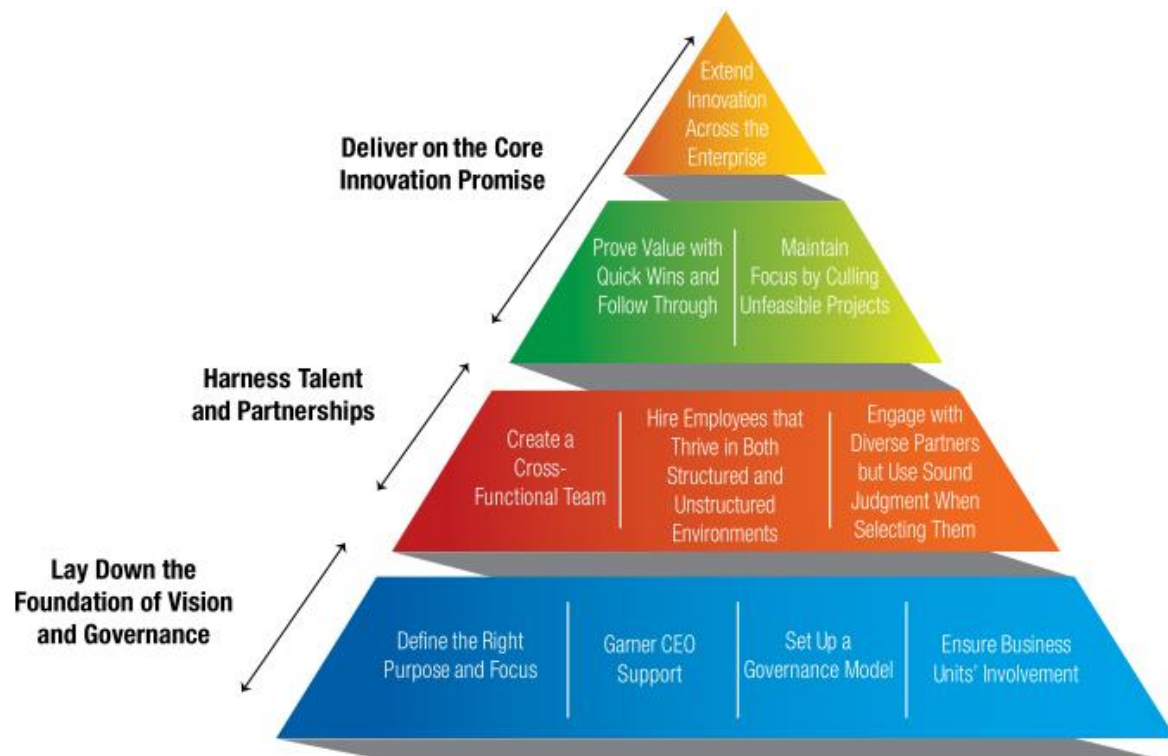
Source: (Herve and Bischopink 2016)

Appendix 4: Governance models for X-Hubs



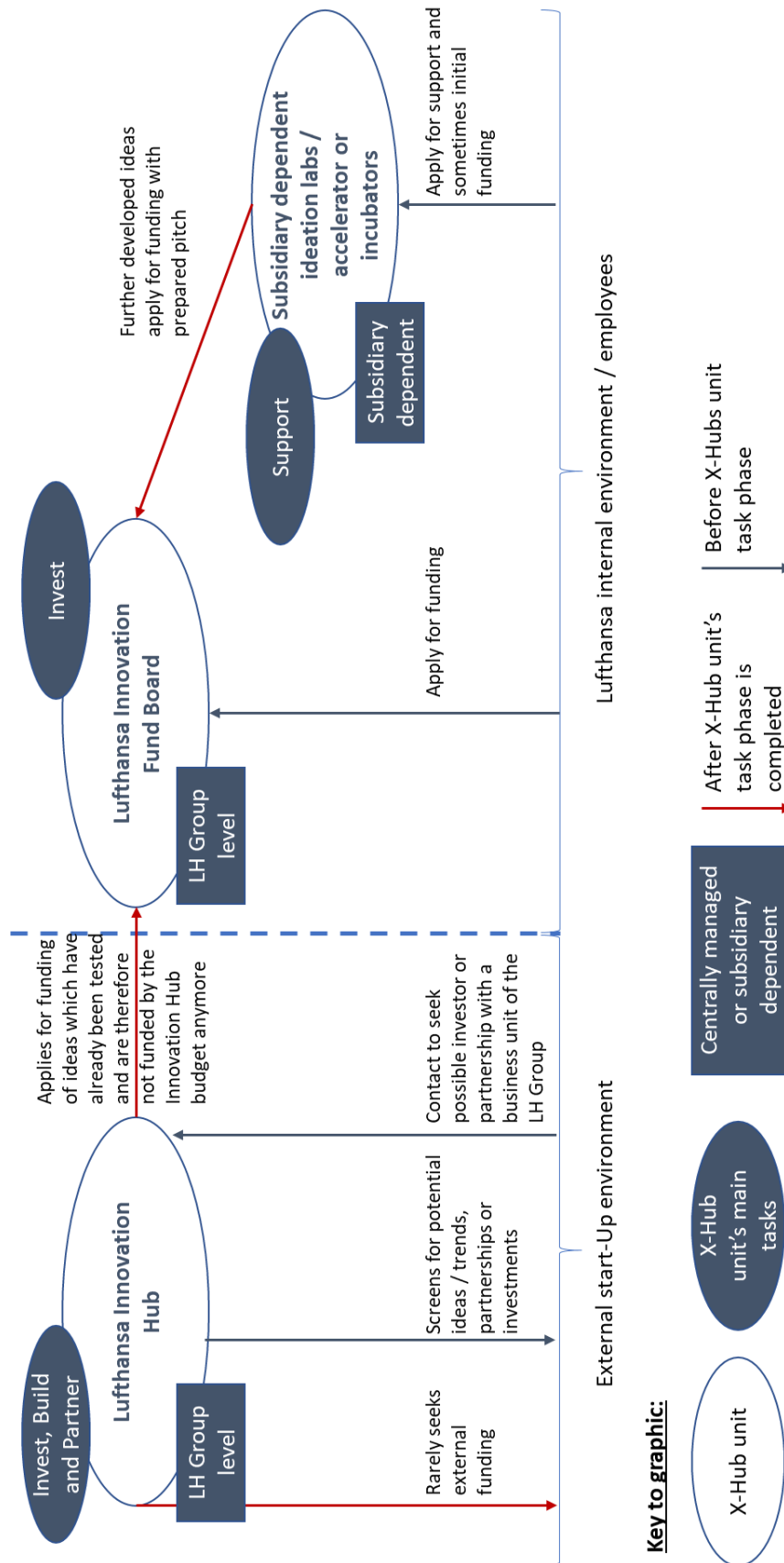
Source: (Solis et al. 2015)

Appendix 5: Critical Success Factor Model by Solis et al.



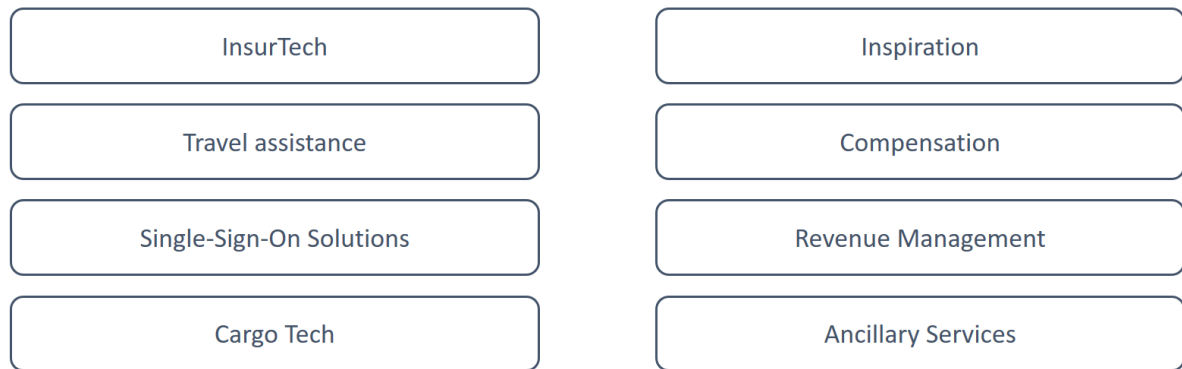
Source: (Solis, Buvat, and Khadikar 2016)

Appendix 6: The Lufthansa X-Hub model – An overview



















Source: Author based on expert interviews

Appendix 7: Eight specific focus fields of the Innovation Hub within the travel tech ecosystem in 2017



Source: Author based on expert interviews and Lufthansa Innovation Hub internal sources

Appendix 8: Evaluation of the Lufthansa X-Hub

	Innovation Hub		Innovation Fund Board		LH Group wide ¹	
	Advantages	Disadvantages	Advantages	Disadvantages	Advantages	Disadvantages
Independence	<ul style="list-style-type: none"> Separate entity → Own entrepreneurial culture and processes Budget allocation for four years Freedom to decide on most important decisions 	<ul style="list-style-type: none"> No own fund No resources & freedom to control ideas after first phase of development / testing 	<ul style="list-style-type: none"> Freedom to decide on which ideas to invest in 	<ul style="list-style-type: none"> No separate entity Highly political Budget allocation every year No control after one year funding phase No right to release idea generator from daily work → Business unit decides in the end thus creating bureaucracy hurdles 		
Involvement of mother company	<ul style="list-style-type: none"> Strong resource sharing (brand, distribution / marketing channel, knowledge) Strong involvement of business units when looking for ideas / partnerships Workshops, presentations etc. within LH Group 	<ul style="list-style-type: none"> No standardized Knowledge sharing with other innovation departments Only little transfer of innovation culture & knowledge Implementation / transfer of idea often fails 	<ul style="list-style-type: none"> Implementation of ideas works better than at Innovation Hub. Yet still room for improvement Transfer of innovative culture & knowledge. Yet still room for improvement 	<ul style="list-style-type: none"> Cultural transfer better than at Innovation Hub but not good yet 	<ul style="list-style-type: none"> Innovative concepts and culture has already been transferred to many subsidiaries. However not enough yet. 	<ul style="list-style-type: none"> No standardized and central ideation processes as well as knowledge sharing
Senior Management Support	<ul style="list-style-type: none"> CDO as second Managing director Management visits several times per month 		<ul style="list-style-type: none"> Rising interest of middle management Most members are middle manager of the LH Group 		<ul style="list-style-type: none"> Innovation and Digitization is fixed priority of CEO and Board of Directors 	<ul style="list-style-type: none"> Strong focus on digitization instead on innovation in general
Clear Vision	<ul style="list-style-type: none"> Clear focus on digitization and the creation of the interface between the Lufthansa Group and the global travel tech scene Clear tasks: Build, Partner, Invest 	<ul style="list-style-type: none"> Focus on technologies and new businesses is less pursued than intended 	<ul style="list-style-type: none"> Clear tasks: Invest 	<ul style="list-style-type: none"> Focus on everything that is new to the organization is to vague formulated Focus on technologies and new businesses is less pursued than intended 	<ul style="list-style-type: none"> Clear focus on digitization within the whole LH Group 	<ul style="list-style-type: none"> Focus on technologies and new businesses is less pursued than intended
Right Employees	<ul style="list-style-type: none"> Ability to attract entrepreneurial and digital minds Small team all with a strong background in innovation Often engaging freelancer Two highly influential Managing Directors (CDO & Successful entrepreneur) 		<ul style="list-style-type: none"> High seniority Mix of different functions and subsidiaries 	<ul style="list-style-type: none"> No LH external members To few people have innovation background and knowledge 		<ul style="list-style-type: none"> "Innovation" title often assigned as reward

Key to graphic:



Mostly complied



Partly complied
















Not complied

Note: 1) Only for additional insights. No concrete evaluation done

Source: Author based on expert interview

Appendix 9: Benefits realized by the Lufthansa X-Hub

	Lufthansa Innovation Hub	Lufthansa Innovation Fund Board
Accelerate the speed of innovation		
Become part of the innovation communities and thereby recognize trends		
Introduce innovative process management practices		
Build a culture of innovation in the larger organization		
Attract and recruit digital & entrepreneurial minds		
Drive employee engagement		
Development of new products, business models, partnerships or investments		 However, not enough focus on radical innovations
Implement projects into relevant business units		
Key to graphic:  Fully enabled  Partly enabled		

Source: Author based on expert interview

Appendix 10: Interviewee details

Shortcut	Company	Role of respondent	Interview date	Duration
LH 1	Lufthansa Innovation Hub	Senior Venture Development Manager	20.04.2018	30min
LH 2	Lufthansa subsidiary	CIO	23.04.2018	68min
LH 3	Lufthansa subsidiary	Innovation Manager	24.04.2018	38min
LH 4	Lufthansa subsidiary	Senior Innovation Manager	24.04.2018	44min
LH 5	Lufthansa	Senior Manager Digitization	25.04.2018	33min
LH 6	Consultant to Lufthansa	Innovation Consultant	03.05.2018	45min
Expert 1	One of the most successful start-ups in Germany	Managing Director	18.04.2018	22min
Expert 2	Prestigious consultancy	Managing Director	18.04.2018	41min
Expert 3	Freelancer	Innovation consultant with intense Start-Up experience	03.05.2018	37min





Source: Author

Appendix 11: Interview guidelines

	Lufthansa internal experts	External experts
1	General Introduction Interview Goal, personal background, confidentiality agreement, agreement to record interview	
2	Impediments to innovation within Deutsche Lufthansa Group	Impediments to innovation within large companies
3	General innovation strategy of Deutsche Lufthansa Group	General Innovation Strategies of large companies
4	Design of the X-Hub of Deutsche Lufthansa Group (key dimensions served as interviewer guideline)	Prominent X-Hub design of other companies (key dimensions served as interviewer guideline)
5	Evaluation of Deutsche Lufthansa Group's X-Hub (broad questioning of pitfalls & opportunities. Success factors served as guidelines to do follow up questions and challenge current X-Hub model)	Pitfalls & Opportunities of current X-Hub models
6	Improvement suggestions for Deutsche Lufthansa Group's X-Hub	Improvement suggestions and key success factors recommendations for X-Hubs

Source: Author

Appendix 12: Quotes on obstacles to innovation within the LH Group

 Organizational culture	 Organizational structure	 Employees	 Processes
<p>“Culture is the biggest obstacle for innovation within Lufthansa. There is the tendency to avoid risk, experimenting and favor everything that improves efficiency” (LH 4)</p> <p>“People are also not able to change this mindset” (LH 4)</p> <p>“A strong problem is the mindset – this includes the values but also the ability to be open for change” (LH 1)</p> <p>“Within the LH Group there is always the mindset to do everything on their own. Partnerships are mostly rejected as they fear that too much money is given away. In my opinion this is wrong as partnerships increase the overall value and only with them you can succeed today” (LH 1)</p>	<p>“In my opinion it is especially the size and the structure of the company. Due to governance, hierarchies, approval processes and controlling most ideas get lost. To get the support for an idea you need the approval of your direct supervisor. After that you need to conduct a pre-study, then you have to get them approved by all interfaces and only thereafter you are allowed to ask the boss of your supervisor. All of this is the opposite of acting innovatively and agile” (LH 5)</p> <p>“The political aspect is also highly important. Due to the large size, ideas that would have been good for the whole organization are dismissed” (LH 4)</p> <p>“Lufthansa is as a consequence much slower than a Start Up” (LH 5)</p> <p>“The governance that has to be set up due to the huge size is a key problem. It inhibits the freedom to test and fail. This kind of security thinking might surely be rational for an airline but not for the digital world” (LH 1)</p>	<p>“For me the key problem lies not in the employees. I think we have great employees and many of them are capable to think creatively, analytically and strategically. Thus it is not a problem of having not enough ideas or people that think out of the box” (LH 5)</p> <p>“If there was an innovative idea that was not within the scope of the normal business issues, it got lost since nobody was able to evaluate the idea. Nobody was used to do that” (LH 2)</p> <p>“Quite often ideas are getting lost due to the middle management. Their incentive systems don’t foster risk taking or exploration of new ideas. Thus they don’t see a point in investing into an idea that is not enough evolved yet or a bit further away from the key issues” (LH 5)</p> <p>“In my opinion there are not enough people within Lufthansa, who have an innovative mindset and who are willing to try out new things that have some uncertainty” (LH 4)</p> <p>“It is certainly hard for Lufthansa to attract the digital and innovative minds” (LH 1)</p>	<p>“Another big issue is the complex IT structure. Due to the many systems, their interdependencies and complexities, it takes years to implement new things” (LH 5)</p> <p>“Due to established processes you are used to do things as they were without questioning anything” (LH 3)</p> <p>“We had a system where people could post ideas. However they were often dismissed without any feedback thus demotivating employees. It was really non-transparent” (LH 2)</p>
General			
<p>“In my opinion Lufthansa has especially a problem with the creation of innovations that are completely new and have less to do with the things we usually do” (LH 3)</p> <p>“Especially radical / disruptive innovations had a hard time within LH. Innovations that were focused on existing business models were mostly implemented successfully as the focus was on improving efficiency” (LH 2)</p>		<p>“If Lufthansa is not catching up in terms of digitization and all the innovation that comes with it, we might end up having no customer touchpoints anymore and provide solely the service of flying” (LH 5)</p> <p>“You can’t say that innovation itself was not successful within Lufthansa. Especially innovations with a focus to improve existing businesses or to enhance efficiency were quite successful. Only due to that Lufthansa is still existing and has a profitable business” (LH 1)</p>	

Source: Expert interviews

Appendix 13: Quotes on Lufthansa Innovation Hub Design and Set-Up

Lufthansa Innovation Hub – Optional design factors

Source of Ideation	<p>„We only focus on external ideation. However, if for example a board member has an idea the he / she wants us to look at, we certainly make an exception“ (LH 1)</p> <p>„We create the interface between the Lufthansa Group and the global travel tech scene.“ (LH 1)</p>
Main tasks / value proposition	<p>„We are not an accelerator or incubator, providing co-working space or mentoring. Instead we are looking for partnerships, ideas to develop and sometimes potential investments“ (LH 1)</p> <p>„We test and build business model innovations. When doing so, we build and validate them directly with potential customer“ (Lufthansa Innovation Hub 2018)</p> <p>„After having a successfully proved concept and prototyp we either pass the project over to a LH Group business unit, found a company and watch out for external funds or apply for funding at the LH Group“ (LH 1)</p> <p>„With a team of three people and sometimes some external experts, we develop first an MVP, validate the product with a customer and provide an initial proof of concept“ (LH 1)</p> <p>„We introduce the LH Group to innovative travel tech start ups and help them to develop a common partnership product“ (LH 1)</p> <p>„The partner task was at the beginning the only task we had“ (LH 1)</p> <p>„Sometimes we only serve as a connector between the start up and the relevant business unit, while in other cases we accompany the project as a projectleader. If the company is struggling with a long approval times for investments, we have the freedom to finance a first prototype“ (Herzog cited in Reiter 2016)</p> <p>„We encourage Lufthansa to invest into specific start-ups and ideas that we have spotted and evaluated“ (LH 1)</p> <p>„At the moment we don't have our own fond. We are working for two years now to initiate one. The only investment we accompanied so far was done by Lufthansa Cargo – they had an interest and we helped them to find and finalize the investment“ (LH 1)</p> <p>„Focus is on digitization“ (LH 4)</p> <p>„Independent on the topic, we focus on two key areas: First, the better business topics – this includes everything on how we can improve existing products or processes. Secondly, the new business topics – this includes everything that we haven't in our portfolio yet. This might be a totally new business model but also a completely new product. Important is only that it focused on digitization and that we have an advantage over competitors due to our mother organization Lufthansa“ (LH 1)</p> <p>„One main goal of the Innovation Hub is to discover and develop products, services or business models that use digitization to improve any point in the traveler's customer journey.“ (LH 6)</p> <p>„We do ideation using one of four perspectives: 1) The Lufthansa perspective (what are the painpoints, what might be improved) 2) The customer perspective (the customer is not only the LH customer but just every traveler 3) The Start-Up perspective (over here we take a look at where the financing is going to, what are the trends etc) 4) Technology perspective (over here we want to assess new technologies. However, this perspective is not our biggest priority at the moment)“ (LH 1)</p>
Topic focus	
Stage of supported idea	<p>„We look out for start ups with an initial proof of concept. Start-ups at the idea stage do not qualify. A good early indicator is whether they already have a disclosed Venture capital backing. (LH 1)“</p>
Duration of support	<p>„There is no fixed duration. It always depends on the project and task“ (LH 4)</p> <p>For the Build task - „When we have tested the product with a prototype at the market, we have three alternatives to continue: 1) We pass the product over to a business unit 2) We found our own company and apply for external funding – this alternative was not used yet even though we are working and making it happen 3) We apply internally at the LH Group for more funding using the Innovation Fund Board“ (LH 1)</p> <p>„After challenging the idea a bit internally, we usually have an incubation phase of 3 months during which we test the product at the market using a prototype. In the end we need to answer two questions 1) Do we solve a problem with our product / service 2) Is it scalable?“ (Herzog cited in Reiter 2016)</p>

Lufthansa Innovation Hub – Optional set-up factors

Launch method	<p>„The Innovation Hub was launched with a small team of eight people – four LH internal people and four external freelancer. During three months we tested whether an innovation hub cooperating with the LH Group might be successful“ (LH 1)</p>
Governance model	<p>„The Innovation Hub is annexed directly to the Chief Digital Officer“ (LH 2)</p> <p>„The Innovation Hub is managed as a separate entity and is therefore much more independent“ (LH 6)</p>

Source: Expert interviews

Appendix 14: Quotes on Lufthansa Innovation Fund Board Design and Set-Up

Lufthansa Innovation Fund Board – Optional design & set-up factors

Source of Ideation	<p>„All employees of all subsidiaries have the right to apply“ (LH 2)</p> <p>„There is however not the probability for external start ups to apply“ (LH 2)</p>
Main tasks / value proposition	<p>„The idea of the Innovation Fund Board is to avoid long approval times and wrong denials of potential ideas. Therefore, innovative ideas can apply to get a funding of up to 500.000 € for one year. The approval and funding is much faster than in the typical Lufthansa organization“ (LH 2)</p> <p>„The innovation fund board also serves as an alternative to fund ideas of the Innovation Hub that have been tested and are therefore no longer funded by it“ (LH 1)</p> <p>„However, the employees are not necessarily free to work solely on the idea.“ (LH 3)</p>
Topic focus	<p>„The Innovation Fund Board is only supporting ideas that are new to the organization and don't belong to the classical product life cycle. Those product improvements need to be financed via the business unit“ (LH 2)</p> <p>„The Innovation Fund Board is not only restricted to digital ideas“ (LH 2)</p> <p>„The Fund Board was purposely founded to enable all kind of innovation, not just on digitization and the innovations this implies“ (LH 6)</p> <p>„The ideas need to be new. Ideally they should be radical, this is however not happening that often“ (LH 6)</p> <p>„There is no clearly defined staged in which the idea has to be. You don't necessarily need a business case. The only thing you need to provide is a short outline of the idea and a justification for how much money you need and for what“ (LH 3)</p> <p>„When we set up the Fund Board, we decided that ideas within different stages can apply. The first stage is, that there has to be an idea – not a solution design yet - that needs to fund a pilot-study to validate it. This idea could have also been fostered by a subsidiary dependent accelerator / ideation lab. The second stage that you apply with a concept. Over here the idea needs for example funding for a prototype and a first trial at the market. Within the third stage, the idea already has done a pilot study, a test trial at the markets and wants to scale the idea now. This case is however rather rare.“ (LH 6)</p> <p>„In the end the applicant only has to show that he / she did her / his homework. This means he has to know what the problem is, the solution and whether there has been a similar idea already within the organization“ (LH 6)</p>
Duration of support	<p>„The funding of 500.000 € is for up to one year.“ (LH 2)</p>
Launch method	<p>„The Innovation Hub was founded without any joint venture or partnership contract“ (LH 5)</p>
Governance model	<p>„The Innovation Fund Board has to report directly to a CXO function, which is in this case the Chief Digital Officer“ (LH 1)</p> <p>„It is part of the business unit managed by the CDO Christian Langer and is contrary to the Innovation Hub not a separate entity“ (LH 6)</p>

Source: Expert interviews

Appendix 15: Quotes on key success factors of the Lufthansa Innovation Fund Board

Innovation Fund Board		Advantages	Disadvantages
Independence	<ul style="list-style-type: none">• “The Board has the freedom to decide which idea to invest in. However an exception applies, if one subsidiary requested that it wants to approve all ideas before.” (LH 2)• “The Fund Board has a budget of up to 10 Mio € per year.” (LH 2)	<ul style="list-style-type: none">• “In my opinion the accelerator is not solving the bureaucracy problems at all since you need to get the approval for funding somewhere else. Even before you need the approval of your boss to get three days off” (LH 5)• “In my opinion neither the fund board nor the accelerator promote a more innovative culture since bureaucracy and structural hurdles are not eliminated” (LH 5)• “In my opinion the Innovation Fund Board is not independent as it has a large political aspect. If for example one subsidiary already received funding, the probability is much lower to be accepted in another round even though all ideas are better than others” (LH 4)• “Of course the business unit has to decide in the beginning whether it wants to pursue the idea and thereby allocate additional employees / resources. This implies logically that some ideas that might have had a great potential are lost due to a wrong incentivization and a wrong mindset of the middle management” (LH 6)• “However, the Innovation Fund Board as well as the accelerator has not the right to give the employees the freedom to work solely on the idea. So usually they need the approval of their boss.” (LH 3)• “Quite often the idea has already gone through different approval rounds within your business unit. As a consequence many potential ideas are denied due to the focus on the daily business” (LH 4)	
Involvement of mother company	<ul style="list-style-type: none">• “Our goals was at the beginning to enable and strengthen the innovation ability in all subsidiaries. We want them to use those concepts such as accelerator, fund boards or ideation labs. In my opinion we were quite successful and there is already quite a progress to see. In general I would say, that most people became more open to all concepts and ideas around innovation” (LH 6)• “Implementation is working better at the Innovation Fund Board than at the Innovation Hub” (LH 5)• “I think we did a great work so far and the initial goal to push innovative concepts into the organization and its subsidiary worked out already. However it has to be coordinated right now” (LH 6)• “Even some manager that had nothing to do with innovation show now interest and attend workshops.” (LH 6)	<ul style="list-style-type: none">• „I don't see a cultural transfer coming from the Innovation Hub or Innovation Fund Board” (LH 5)• “There is no function yet that records all ideas and creates a portfolio. In my opinion knowledge-sharing is highly needed. However there are just not enough resources available. However, I also think that this is owed to the progress we made in terms of bringing innovation to the whole organization.” (LH 6)• “Of course it happens sometimes, that a product is funded by the Fund Board, developed and tested and is then wrongfully not fostered anymore by a business unit.” (LH 6)	
Senior Management Support	<ul style="list-style-type: none">• “Even some manager that had nothing to do with innovation show now interest and attend workshops.” (LH 6)		
Clear Vision	<ul style="list-style-type: none">• “The board consists of several heads of business units and a board member.” (LH 3)• “The board consists of several heads of business units and a board member. Those people should have at least some background in the area of innovation” (LH 3)• „There is one person that is responsible for the Fund Board. She is assessing the applications, gives feedback and coordinates the board meetings when it is decided whether to fund an idea. The board consists of several senior employees from various functions such as marketing, strategy, controlling etc. Additionally one executive from a board of a subsidiary is always attending, so that in total 6-8 person are deciding” (LH 6)	<ul style="list-style-type: none">• “When I applied the board was not sure whether the idea is not “new” enough to qualify for the funding” (LH 5)• „In my opinion it is useful to have a mix of several functions as well as subsidiaries. However I feel that you shouldn't force that too much. For example I don't think that you need a person of controlling every time.” (LH 6)• „I also think, that there are still to few entrepreneurial people that are willing to take some risk and develop also radical ideas.” (Lh 6)• “What I miss in the board are 1-2 external persons that bring some new and objective opinions” (LH 6)• “In my opinion the innovation fund board has not the right employees. They have not the innovative mind that is open for failure and risk” (LH 4)• “I have the opinion that often people receive the title “innovation manager” or member of the innovation fund board as a promotion without really having the required background in the field” (LH 4)	
Right Employees			

Source: Expert interviews

Appendix 16: Quotes on key success factors of the Lufthansa Innovation Hub

	Innovation Hub	Advantages	Disadvantages
Independence	<ul style="list-style-type: none">• “We are not dependent on a specific business unit since we have to report directly to the Chief Digital Officer. But we don’t need to report on a daily, weekly or monthly basis, which gives us a high independence” (LH 1)• “We act like a speedboat for LH, since we have a budget with which we can do whatever we want to. We don’t need to request for approvals. Instead we can bypass the typical LH rules and have the freedom to test and fail.” (LH 1)• “We received the money from the CFO. The first time we received money for four months, the second time for one year and then for four years” (LH 1)• “We have the entrepreneurial culture that allows and encourages us to fail and experiment” (LH 1)	<ul style="list-style-type: none">• “Quite often we take some business unit manager with us when talking with start ups in order to integrate the business function from the very first beginning” (LH 1)• „Even if we develop our own ideas / business models or products, we try to integrate some business units from the beginning, so that it might be implemented if an initial proof of concept and prototyp is successful. However, we also use our freedom sometimes and develop an idea firstly on our own.“ (LH 1)• “When looking for partnerships, we initially used a push concept, suggesting ideas to business units that we found interesting. However we switched to a pull concept later on to integrate the business units from the very first beginning. Thereby we look and ask within the business units which topics are required and then we go out and take a look” (LH 1)• „Also when building / developing new products we look inside Lufthansa to discover points” (LH 1)• “Using the advantages of the LH Group helps us in various ways. First, the powerful brand opens us many doors - be it to enable a partnership or just talk to start-ups. Furthermore using the marketing as well as distribution channels enables us to scale all products and services too such an extent as no start up could do it. Lastly the knowledge we have within the LH Group gives us another huge advantage. This paired with our start-up approach is something only few companies are able to achieve.” (LH 1)• “We do a lot to transfer our culture, innovative knowledge and network to the LH Group by giving workshops, presentations, and much more” (LH 1)	<ul style="list-style-type: none">• „A big weakness is unfortunately that many ideas are neglected and loose ground after we have developed them and forwarded to a specific business unit.” (LH 1)• „In my opinion, the Innovation Hub is to much encapsulated as if they are working on another planet. It is not transferring any cultural aspect or process knowledge to the LH Group” (LH 4)• „I dont see a cultural transfer coming from the Innovation Hub or Innovation Fund Board” (LH 5)
Involvement of mother company			
Senior Management Support	<ul style="list-style-type: none">• “Innovation & digitization is a fixed strategic priority of CEO Carsten Spohr” (LH 3)• “We have senior and middle management visiting us several times per months” (LH 1)• “The CDO Christian Langer was appointed as the second managing director.” (LH 1)		<ul style="list-style-type: none">• “Usually we also have technology as a focus topic. However due to the lack of resources, we didn’t do too much in this area” (LH 1)• “While incremental innovations work out pretty well, I feel that new business topics are to rarely fostered and developed, even within the Innovation Hub” (LH 6)• “We need to become even more brave and try out more radical ideas” (LH 1)• “For me, the Innovation Hub is focusing too much on digitization instead of innovation in general” (LH 4)
Clear Vision			
Right Employees	<ul style="list-style-type: none">• „Due to our innovative approach and freedom, we were able to attract digital and entrepreneurial minds with a background in venture capital, consulting as well successful start-ups. This enabled us to create a large and valuable network” (LH 1)• „We are a small team of 20 persons. Most of them have a background within the entrepreneurial system – be it a start-up, VC, or consultancy.” (LH 1)• „Quite often we engage freelancer, marketing agencies or similar external resources” (LH 1)		

Source: Expert interviews

Appendix 17: Quotes on conclusions and general learnings

Conclusions & General Learnings

Source: Expert interviews

Knowledge sharing	Independence of Hub	Involvement of the mother company	Implementation Plan
<p>“We have a central function that is collecting and sharing all ideas and their status. This helps us to leverage our size and the amount of ideas” (Expert 1)</p> <p>“Creating a central knowledge-sharing function is in my opinion essential. The problems however are, that to few resources are available. Another aspect is data transparency. As the LH Group is so large, there are several companies that have various data privacy requirements making everything even more complicated” (LH 6)</p> <p>“Often it happens, that an idea has already come up several times but nobody has recorded it” (LH 6)</p> <p>“It is also important to create a central function to establish ideation in every subsidiary. There has to be a function that monitors, assess the resources / employees needed and allocated them. There are already many initiatives but not on a whole group level and not centralized.” (LH 6)</p>	<p>“One Example is EON, here the accelerator has the right to release employees from 20% of their daily work to pursue the innovative idea” (Expert 3)</p> <p>“The success of the X-Hub hinges on its independence” (Expert 2)</p> <p>“The unit needs to have enough authority to decide on all decisions. This does also include to release employees from their daily work” (Expert 2)</p> <p>“You need to give the employees more freedom to work on innovative projects. In our company we give them 20% of their time to work on them” (Expert 1)</p> <p>“The X-Hub needs to have the freedom to release people from their daily work to pursue innovations” (Expert 1)</p> <p>“The biggest mistake one can do is pushing employees to bring in ideas and then discard those ideas without giving feedback” (Expert 2)</p>	<p>“We need to transfer innovative values and processes better into the LH Group” (LH 5)</p> <p>“The unit should not be an ivory tower that is working completely independent from the business units. It should work independently in the ideation phase and then transfer and implement the idea together with the relevant business unit” (Expert 2)</p> <p>„I dont see a cultural transfer coming from the Innovation Hub or Innovation Fund Board“ (LH 5)</p>	<p>“The majority of large companies have great ideas but are not implementing them since they are overwhelmed by the daily business” (Expert 2)</p> <p>“In order to improve the implementation we are working on a method that allows us to spin-off ideas” (LH 1)</p> <p>“We are developing a digital fund that has a much higher funding volume in order to fund topics that need more cash right in the beginning or after an initial funding via the Fund Board” (LH 2)</p> <p>“In my opinion, in order to avoid the loss of ideas due to wrong denials of the middle management, one has to change more the mindset rather than the KPIs” (LH 6)</p> <p>“You always have to involve business units from the very first beginning and explain to them why this idea is important for them” (Expert 2)</p> <p>“You need to have a clear plan on how to transfer and implement projects” (Expert 3)</p> <p>„A big weakness is unfortunately that many ideas are neglected and loose ground after we have developed them and forwarded to a specific business unit.“ (LH 1)</p>
Radical innovations	<p>“If the idea is to far away from the core business, no business unit will fund and implement it” (Expert 2)</p> <p>“In order to identify radical innovations, cooperation with research institutes or universities are sometimes a good idea” (Expert 2)</p> <p>“Research cooperations with universities are a good idea to develop radical innovations” (Expert 3)</p>		

Appendix 18: Quotes on side topics

General innovation Strategy Lufthansa

„Focus not on innovation itself but more on digitization. The enablement of innovation came consequently along with this“ (LH 3)

„We have a strong focus on digitization – not on Innovation itself“ (LH 1)

„There are especially three focus areas within the digitization measures: 1) Digitize the core 2) Enhance own products 3) Create new business models“ (LH 2)

„Then within innovation, I think that it is a mix of both - incremental as well as radical innovation – that is fostered and pushed. You have to improve both, the existing business, as well as the development of new business models“ (LH 3)

„The focus has shifted. Carsten Spohr – CEO of LH Group – announced the initiative to invest 500 Mio € into innovative ideas. This focus is not on innovation itself but more on digitization. However, there are several chances to create radical innovations due to digitization.“ (LH 2)

Accelerator / ideation lab

“The Lufthansa accelerator is open for employees of several subsidiaries“ (LH 6)

„The accelerator provides only support and is not giving any money. It helps to learn some innovation processes such as design thinking. You are also encouraged to challenge and develop your idea in an innovative way“ (LH 3)

„The outcome after attending the accelerator should be a better understanding of whether the idea has a potential or not. Furthermore you develop a business plan and pitch to apply for funding“ (LH 4)

„However, the employees are not necessarily free to work solely on the idea.“ (LH 3)
„Invent It provides support as well as a small initial funding“ (LH 2)

“The accelerator program hosts a workshop that last 5 days“ (LH 5)

“The whole accelerator program lasts 3 months and involves an extensive time to prove, develop and challenge the idea using expertise from innovation professionals“ (LH 6)

„The accelerator is especially supporting early stage ideas that need help in further developing and challenging the idea“ (LH 3)

“Lufthansa Technik for example has a really good accelerator and ideation lab“ (LH 1)

Source: Expert Interviews

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